MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 1, 2019/2020

EEN4206 –SEMICONDUCTOR PACKAGING AND TEST

(ME/RE/TE)

22 OCTOBER 2019
2:30 pm – 4:30 pm
(2 Hours)

INSTRUCTIONS TO STUDENT

1. This Question paper consists of 2 pages excluding the cover page with 4 Questions only.

2. Attempt **ALL (4)** questions. All questions carry equal marks and the distribution of the marks for each question is given.

3. Please write all your answers in the Answer Booklet provided.

Question 1 [25 marks]

(a)(i) Name **FOUR (4)** Enabling technologies based on Industry4WRD Policy for Industrial 4.0. [4 marks]

(ii) Surface-mount technology (SMT) involves mounting of semiconductor devices on printed circuit board by reflow soldering. With the aid of diagrams, describe **TWO (2)** types of surface mount devices. [6 marks]

(b) List **FIVE (5)** systems in the process block of a die attach equipment. [5 marks]

(c) Describe die attach process in semiconductor device manufacturing. Hence, explain the conductive die attach film (C-DAF) technique. [5 + 5 marks]

Question 2 [25 marks]

(a) With the aid of diagram, provide **THREE (3)** parameters of a capillary dimensions that will affects the formation of stitch bond. [5 marks]

(b) Ball bonding cycle is the process of interconnecting die pads via wire to leadframe. Sketch and explain **FOUR (4)** main phases of this cycle. [2 + 6 marks]

(c)(i) What is epoxy mold compound? [3 marks]
(ii) Provide **THREE (3)** functions of epoxy mold compound. [3 marks]

(d) Explain the general process flow for molding process. [6 marks]

Continued...

Question 3 [25 marks]

(a) A certain semiconductor product is manufactured in 2 batches, referred as *Lot 1* and *Lot 2* with the manufactured quantity as shown in Table Q3(a). Both *Lot 1* and *Lot 2* are then undergo a specific test process at different test equipment and the non-defective quantity for each batch is recorded.

(i) Calculate the yield percentage for this product. [4 marks]

(ii) Based on your calculation in above, suggest a solution that may be implied to improve the yield percentage for *Lot 2*. [2 marks]

Product	Manufactured Quantity	Non-defective Quantity
Lot 1	5000	4765
Lot 2	4800	1500

Table Q3(a)

(b) Explain **THREE (3)** types of electrical tests analysis that are essential in ensuring the sustainability and reliability of a semiconductor device. [9 marks]

(c) Explain the differences between bright field and dark field optical microscopy illumination techniques. [10 marks]

Question 4 [25 marks]

(a) A system with 10^6 transistors has 5 device failures per month.

(i) Calculate the failure rate in FIT and MTTF for this system. [5 marks]

(ii) The customer requires 5FIT in 10 years. Calculate the PPM after 10 years. [3 marks]

(iii) How does FIT is able in determining the reliability of a product? [3 marks]

(b) Sketch and explain reliability failure analysis characteristics curve. [2 + 6 marks]

(c) Recently, there have been growing concerns on environmental issues contributed by electronics industries. Discuss **TWO (2)** environmental impacts that may cause by manufacturing plants. [6 marks]

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